

Linear Equations

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- Calculating and illustrating market equilibrium using linear demand and supply functions

Demand & Supply Equations

$$QD = 2,000 - 200P$$

$$QS = -400 + 400P$$

Table 1

| Price (\$) | Calculation of QD | Quantity Demanded | Calculation of QS | Quantity Supplied |
|------------|-------------------|-------------------|-------------------|-------------------|
| 0 | $2,000 - 0$ | 2000 | $-400 + 0$ | -400 |
| 1 | $2,000 - 200$ | 1800 | $-400 + 400$ | 0 |
| 2 | $2,000 - 400$ | 1600 | $-400 + 800$ | 400 |
| 3 | $2,000 - 600$ | 1400 | $-400 + 1200$ | 800 |

Graph 1

Simultaneous Equations

$$QD = 2000 - 200P$$

$$QS = -400 + 400P$$

At equilibrium $QD=QS$. So, at equilibrium:

$$2000 - 200P = -400 + 400P$$

$$2000 = -400 + 600P$$

$$600P = 2400$$

$$P = \$4$$

$$QD = 2000 - 200P$$

$$QD = 2000 - (200 \times 4)$$

$$QD = 2000 - 800$$

$$QD = 1200 \text{ units}$$

Or

$$QS = -400 + 400P$$

$$QS = -400 + (400 \times 4)$$

$$QS = -400 + 1600$$

$$QS = 1200 \text{ units}$$

Hence,

Equilibrium price = \$4 per unit

Equilibrium quantity demanded and supplied = 1200 units

Calculating new market equilibrium
following a **shift** in demand or supply

$$\text{New } QD = 1400 - 200P$$

Table 2

| Price (\$) | Calculation of QD | Quantity Demanded |
|------------|-------------------|-------------------|
| 0 | $1400 - 0$ | 1400 |
| 1 | $1400 - 200$ | 1200 |
| 2 | $1200 - 400$ | 800 |
| 3 | $1200 - 600$ | 600 |

Graph 2

Simultaneous Equations

$$QD = 1400 - 200P$$

$$QS = -400 + 400P$$

$$1400 - 200P = -400 + 400P$$

$$600P = 1800$$

$$P = \$3$$

$$QD = 1400 - 200P$$

$$QD = 1400 - (200 \times 3)$$

$$QD = 800 \text{ units}$$

Or

$$QS = -400 + 400P$$

$$QS = -400 + (400 \times 3)$$

$$QS = -400 + 1200$$

$$QS = 800 \text{ units}$$

Calculating **excess** supply & **excess** demand

Original price = \$4

Substitute the original price into the new QD & QS

$$QD = 1400 - 200P$$

$$QD = 1400 - (200 \times 4)$$

$$QD = 600 \text{ units}$$

$$QS = -400 + 400P$$

$$QS = -400 + (400 \times 4)$$

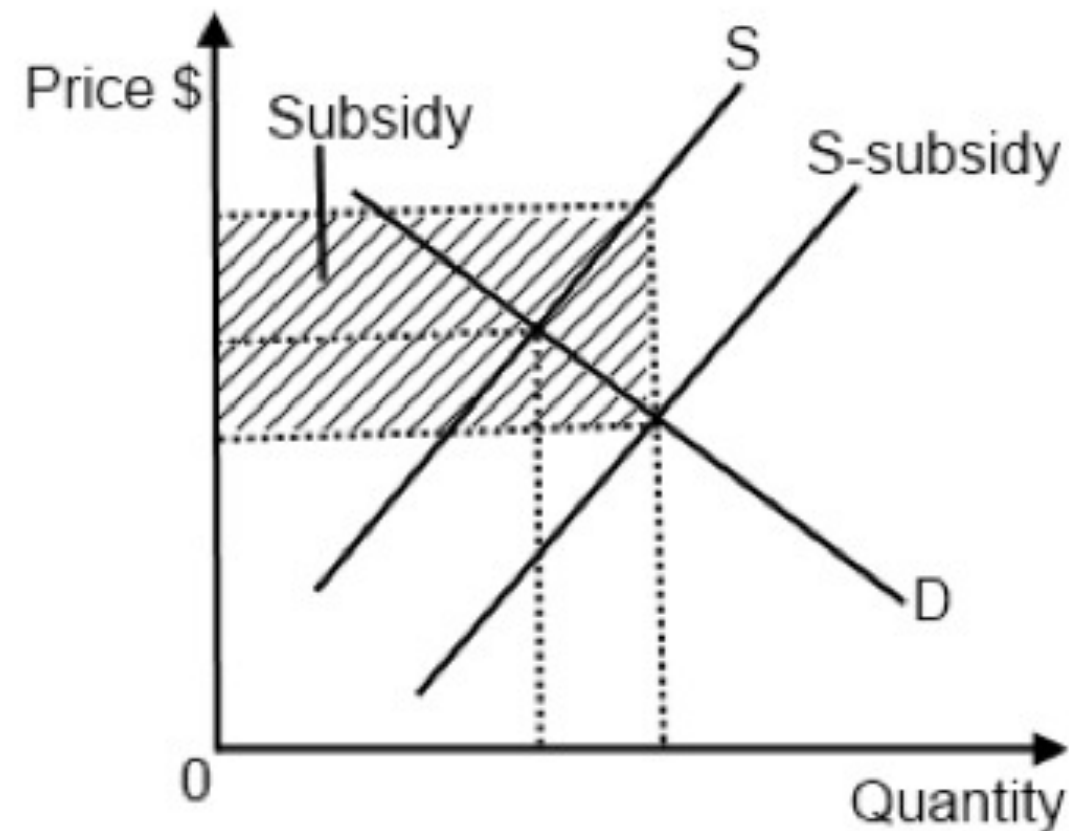
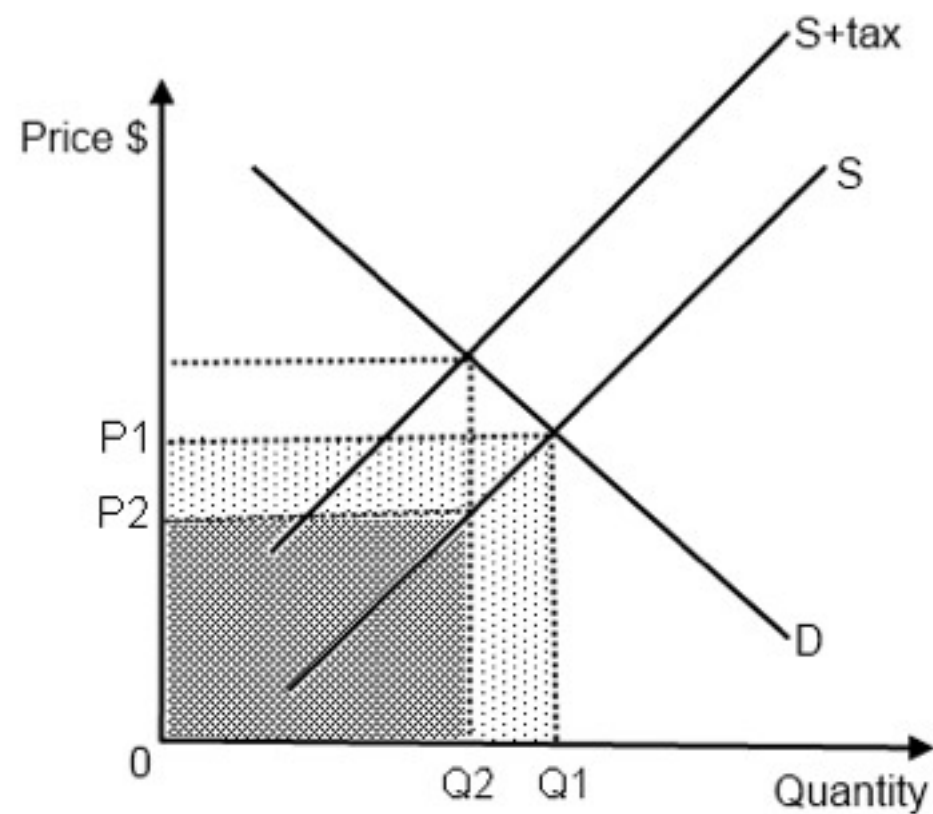
$$QS = 1200 \text{ units}$$

$$\text{Excess supply} = 1200 - 600 = 600 \text{ units}$$

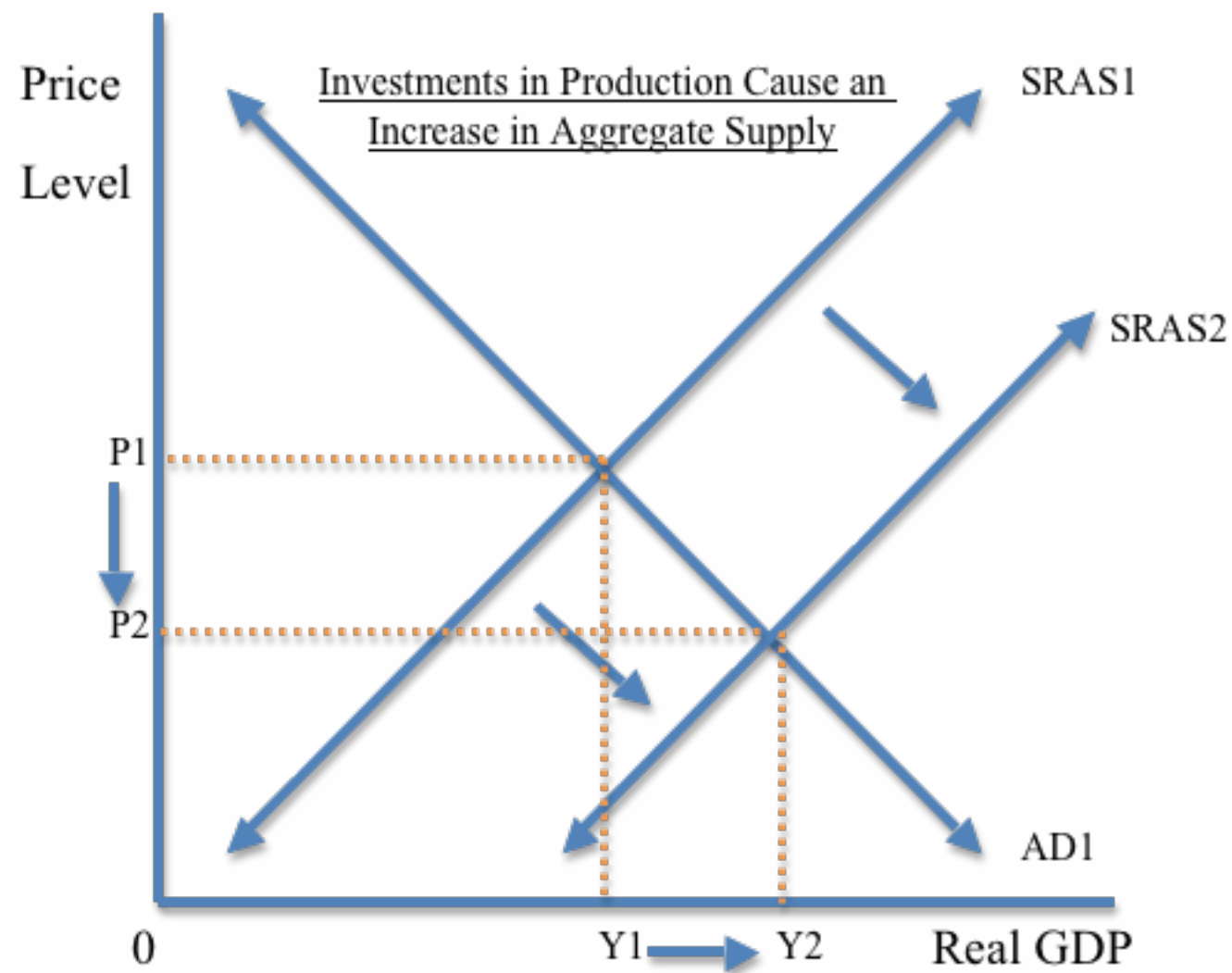
Other Usages

- Calculating indirect taxes and subsidies
- Aggregate demand and supply
- Exchange rates

Indirect taxes & Subsidies



Aggregate Demand & Supply



Exchange Rates

